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Factors associated with perceived ease of access to syringes in Appalachian North Carolina

Delesha M. Carpenter, PhD¹, William A. Zule, DrPH², Caitlin M. Hennessy, BS², Donna M. Evon, PhD³, Christopher B. Hurt, MD⁴, Bayla Ostrach, PhD⁵

¹Eshelman School of Pharmacy, University of North Carolina, Chapel Hill, North Carolina, USA

²RTI International, Research Triangle Park, North Carolina, USA

³Department of Medicine, University of North Carolina, Chapel Hill, North Carolina, USA

⁴Institute for Global Health & Infectious Diseases, University of North Carolina, Chapel Hill, North Carolina, USA

⁵Family Medicine & Medical Anthropology, Boston University School of Medicine, Boston, Massachusetts, USA

Abstract

Purpose: To examine associations between perceived ease of syringe access, syringe sources, injection behaviors, and law enforcement (LE) interactions among people who inject drugs (PWID) in rural Appalachian North Carolina (NC).

Methods: Using respondent-driven sampling, a diverse sample of 309 self-reported PWID were recruited from rural Appalachian NC. Data were collected via audio computer-assisted self-interview technology from February 2019 through March 2020. Respondents reported demographics, sources of syringes, LE interactions, and injection behaviors. Univariate, bivariate, and linear regression analyses were performed.

Findings: Respondents most often obtained syringes from pharmacies and syringe service programs (SSPs). Twenty-one percent disagreed that it was easy to obtain sterile syringes, with 28% reporting low or no access to an SSP. PWID who reported longer physical distances to an SSP had greater difficulty accessing syringes ($P<.001$). PWID who reported greater ease of access to syringes reported engaging in receptive syringe sharing less often ($P<.01$). PWID who were stopped and searched by LE more often reported injecting drugs somebody else prepared with nonsterile supplies more often ($P<.01$). Participants shared used injection supplies more than twice as often than they shared used syringes.

Conclusions: These results underscore the importance of SSPs to mitigate the spread of human immunodeficiency virus and viral hepatitis in rural areas. Supporting mobile SSP services in rural

Correspondence: Delesha M. Carpenter, Eshelman School of Pharmacy, University of North Carolina, 220 Campus Drive, Karpen Hall, CPO 2125, Asheville, NC 28804, USA. dmcarpenter@unc.edu.

CONFLICTS OF INTEREST

The authors report no conflicts of interest.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

areas could increase access to sterile syringes and injection supplies. SSPs should educate PWID about the importance of not sharing injection supplies. Pharmacies could increase syringe access in areas where SSPs do not operate.

Keywords

access; harm reduction; HCV; HIV; injecting; PWID; syringe service program

INTRODUCTION

Compared to the general US population, people who inject drugs (PWID) are at increased risk of overdose¹ and acquiring human immunodeficiency virus (HIV), hepatitis C virus (HCV),^{2,3} and other infectious diseases, such as COVID-19.⁴ At least 2 million people in the United States live with untreated HCV,⁵ with the fastest growing rates among PWID: an estimated 41% of people with recent injecting drug use live with HCV.⁶ The recent growth of HCV rates especially among young, white, rural PWID is attributed to injection drug use (IDU) without adequate access to sterile injecting equipment.⁷ Approximately 1.2 million people in the United States are living with HIV, with 7% of newly diagnosed HIV infections being detected among PWID.⁸ Meanwhile, drug overdose deaths increased at a rate of more than 50% from 2013 to 2019, even before the COVID-19 pandemic.⁹ Structural and policy factors surrounding the pandemic only intensified disproportionate risks for and rates of SARS-CoV-2 infection, overdose, and HCV and/or HIV among PWID,¹⁰ especially in the South and rural areas.^{11,12} Overdose rates accelerated during the COVID-19 pandemic, contributing to a record number of deaths in a 12-month period¹³—in addition to significant disruptions in HIV and HCV screening, testing, and treatment for PWID.^{12,14}

Complicating disproportionate rates of infectious disease and overdose, PWID report greater difficulty accessing nonjudgmental and high-quality health care, especially in rural areas of the United States, Appalachia, and the United States South.^{12,15,16} Some of the reasons that have been attributed to the gaps in health care access among rural PWID include: fewer substance use services, including syringe service programs (SSPs), fewer health professionals, including physicians who specialize in addiction medicine, transportation barriers,¹⁷ and greater stigma toward PWID.^{15,16,18,19} The combination of increased risks for and susceptibility to infections, other negative health sequelae of criminalized substance use, and reduced access to care are evident in increased costs associated with IDU-related health care needs. For example, HCV treatment has become increasingly effective and cost-effective in recent years, with particular improvements in cost-effectiveness seen when treatment uptake is increased among PWID.²⁰ Some estimates of the savings associated with eliminating HCV in the United States are as high as \$6.5 billion (U.S.D.) annually, in addition to the financial benefits of increased labor productivity.²¹ Researchers calculating the costs and financial benefits of eliminating HCV recognize the role of expanding harm reduction approaches, including SSPs in reducing infection-related costs.²¹

In addition to expanding access to infection and substance use disorder treatment, provision of adequate safer drug consumption supplies helps prevent the spread of HIV and HCV, as well as reduces risks for endocarditis, overdose, and other negative health consequences of

substance use.^{22–24} Yet, the availability of SSPs varies widely across much of rural America. As a result, sharing or reusing equipment, such as syringes, cookers, filters (cottons), water, and tourniquets among PWID, is common. Specifically, these situations—along with injecting from the same liquefied drug solution—confer an increased risk of bloodborne pathogen transmission.^{2,23,25–31} Given the known risks of multiperson use of injecting equipment, a large body of evidence demonstrates the protective public health benefits of SSPs, which provide PWID with sterile syringes and other safer drug consumption supplies in order to prevent reuse.^{23,32,33} SSPs are recognized by the Centers for Disease Control and Prevention (CDC) as 1 of 10 evidence-based strategies for preventing overdose deaths.³² Community-based, mobile SSPs are particularly effective at reducing barriers, such as transportation,¹⁷ that affect rural PWID.³⁴ Specifically, mobile distribution of safer drug consumption supplies can increase access to services³⁵ by addressing transportation and other barriers to harm reduction that are greater in rural areas.¹⁷ However, PWID in rural areas may be less aware of SSPs.³⁶

SSPs that adhere to evidence-based best practices and offer sufficient supplies for participants to use sterile items with each injection^{34,37} are more widely available in urban, Northern, and coastal areas as compared to rural, Southern, and Appalachian regions.^{36,38,39} A recent study found that people with HCV in rural areas lived farther from SSPs compared to those in urban areas.²⁴ The proportion of people with HCV living nearer to an SSP was lowest in the South.²⁴ Secondary exchange of safer injecting supplies, in which someone receives supplies from an SSP and distributes them to others, reduces the risk of certain infections, including HIV.^{40–43} Secondary exchange is thought to be particularly key to syringe access in rural areas.³³

Existing research about rural syringe access and SSP use, particularly in Southern Appalachia, is limited. Two recent studies found that Appalachian PWID who exclusively obtained syringes at SSPs were more likely to use a new syringe every time they inject⁴⁴ and accessing syringes at an SSP reduced the likelihood of receptive syringe sharing; a known risk factor for HIV and HCV.⁴⁴ Since the beginning of the COVID-19 pandemic, mobile distribution efforts by harm reductionists in 1 NC Appalachian county demonstrated the feasibility of maintaining access to safer drug consumption supplies for PWID who would otherwise lack it.¹²

Law enforcement (LE) surveillance, presence, and harassment of PWID threaten the success of SSPs and harm reduction efforts.^{45–50} A recent survey of rural Appalachian PWID indicated fear of arrest as the greatest barrier to using a new syringe for every injecting episode.⁵¹ Approaches to policing that emphasize punishment for misdemeanor-level crimes, such as trespassing and loitering, are associated with reduced use of SSPs,^{47,48,52} and policing activity around SSPs is associated with arrests for possession of legal, safe injecting supplies, increased risk behavior, such as syringe sharing, increased infectious disease transmission, and increased overdose deaths.^{47,48,50,53,54} A recent systematic review found associations between policing and HIV risk behaviors and noted an underrepresentation of low-income settings, making the current study among rural, low-income PWID an important contribution.⁵⁵

Our objective was to better understand factors associated with syringe access and sharing among a sample of PWID living in rural Appalachian NC. We specifically examined the most common sources of syringes and associations between perceived ease of access and demographic factors, such as gender, syringe use behaviors, LE interactions, and geographic accessibility. These topics are timely and compelling given the greater prevalence of overdose, greater risks for dual HIV/HCV outbreaks, and higher rates of opioid use disorder diagnoses in the United States South, Appalachia, and rural areas.^{39,56–58}

METHODS

Setting

Data for this study were collected from participants recruited from the far western counties of North Carolina (NC), a region of Appalachia identified by the CDC as being at increased risk for dual HIV/HCV outbreaks related to IDU.⁵⁷ Eight counties (Public Health Region 1) were included: Cherokee, Clay, Graham, Haywood, Jackson, Macon, Swain, and Transylvania. The Index of Relative Rurality for these 8 counties ranged from 0.49 to 0.55, indicating a moderate to high degree of rurality, where scores closer to 1 indicate greater rurality.^{59–61} The North Carolina Department of Health and Human Services vulnerability assessment identified these 8 counties as having high rates of acute HCV infection, chronic HCV, and opioid overdose fatalities.⁶² At the time of this study, 3 of the 8 counties (Haywood, Jackson, and Macon) hosted SSPs.

Participants

Eligibility criteria included a minimum age of 18 years, ability to speak English, currently residing in a study county, and reporting injection of any substance in the past 30 days (eg, heroin, other opioids, methamphetamine, and other nonprescribed drugs).

Recruitment

Participants were recruited using respondent-driven sampling, which is a coupon-based chain-referral sampling approach. “Seeds” (initial recruits) were either participants in qualitative interviews conducted during a formative phase or persons recruited from flyers who met eligibility requirements and consented to participate. Each seed and subsequent recruit received up to 4 coupons to distribute to peers they thought might be eligible. We calculated unadjusted and adjusted average network sizes, homophily, and population weights for participants who did not report obtaining syringes from pharmacies and those who did report obtaining syringes from pharmacies (Table S1). Due to the large number of seeds ($n = 71$), many of which were unproductive, we did not use weighted data in any of our analyses.^{63–68} Participants received \$25 for each coupon they distributed that resulted in an eligible recruit.

Data collection

Data were collected from February 2019 through mid-March 2020 (coinciding with the COVID-19 public health emergency declaration in NC). Local health departments in Jackson and Cherokee counties provided space in their facilities, where study questionnaires were administered using audio computer-assisted self-interview (ACASI) technology,

which has been shown to increase reporting of potentially embarrassing and stigmatizing behaviors.^{69,70} Prior to beginning the questionnaire, participants completed a screener to ensure everyone who started the questionnaire met eligibility criteria.

Measures

Most domains (eg, age, race, ethnicity, lifetime drug use, recent drug use, frequency of injection, syringe acquisition, substance use disorder treatment experiences, and criminal justice involvement) were assessed using items developed as part of a CDC cooperative agreement across multiple study sites. These other sites assessed these same variables in their respective geographic areas (interested readers can contact the second author for a copy of the study questionnaire).

Demographic variables—Participants reported age, gender, education, race, ethnicity, and the zip code in which they slept most often in the past 30 days.

Law interactions—Participants reported how many times in the past 6 months LE had stopped and searched them, their car, or their belongings and how often they had been arrested and booked for any offense(s), excluding minor traffic violations.

Sources of syringes—Participants reported whether they obtained needles (yes/no) from the following sources in the past 30 days: a pharmacy, SSP, secondary exchanger, farm supply store, veterinary practice, person selling drugs or syringes, partner or relative, friend or acquaintance, or found needles. For the same 30-day window, participants also identified the source from which they obtained *most* of their syringes or needles and reported how many times they obtained syringes from a pharmacy and/or an SSP. The current street price of a syringe in their community (in dollars) was also queried.

Ease of syringe access—Perceived ease of access was measured with 1 item that asked how strongly participants agreed with the following statement, “It’s easy for me to get new, clean syringes or needles.” Responses ranged from 0 = “strongly disagree” to 4 = “strongly agree”; the midpoint option was 2 = “uncertain.” Participants also reported how close the nearest syringe or needle exchange program was to where they lived; responses included: 1 = they could walk or drive there in less than 30 minutes or a mobile program comes close to where they lived, 2 = they could drive there in 30–60 minutes, or 3 = more than an hour drive or no syringe access program in their community.

Injection behaviors—Participants reported, on average, how often they injected any drug in the last 30 days; responses ranged from “never” to “more than 3 times per day.” Participants also reported how many times in the past 30 days they: (1) used a syringe or needle that they knew was used by somebody else (receptive syringe sharing); (2) used a cotton, cooker, spoon, or water for rinsing or mixing that they knew was used by somebody else; (3) let someone else use a cotton, cooker, spoon, or water for rinsing or mixing after they used it; and (4) injected drugs that somebody else prepared, mixed, or divided with a used syringe. Each injection behavior was measured as a continuous variable that ranged

from 0 to 30, with higher scores indicating a greater number of days that the participant engaged in each behavior.

Data analysis—Data were imported into IBM SPSS Statistics Version 26. Descriptive statistics were calculated to characterize the study sample and variables of interest. Correlation coefficients were calculated to examine the relationship between perceived ease of access and other measured variables. Student's *t*-tests and Pearson's chi-square tests, as appropriate, were calculated to examine whether there were significant differences between groups. Linear regression was used to gauge the association between perceived ease of access as the dependent variable and participant demographics (age, gender, level of education, race, and ethnicity), number of injections per day, distance to SSP, price of syringes, and LE behaviors (number of times stopped and searched and number of times arrested and booked in the past 6 months) as independent variables. A linear regression was selected over a logistic regression because the outcome variable had 5 categories, including a middle “uncertain” category, that would not fit well into a dichotomized variable. Linear regressions have performed well for 5-category variables, even when the data are skewed.⁷¹ Statistical significance was set at $\alpha = 0.05$ for all assessments.

RESULTS

Sample characteristics

Of 350 eligible individuals recruited, 309 had injected drugs in the past 30 days and were included in this analysis (Table 1). Most participants resided in Jackson County ($n = 181$) or Cherokee County ($n = 80$). Mean participant age was 34.5 years (median = 32 years) and 26% of participants were American Indian. Twenty-nine percent lived in a county identified by the CDC as at risk for a dual HIV/HCV outbreak.⁴¹

Figure 1 shows the counties where participants slept most often in the past 30 days, locations where SSPs serving the study region were based at the time of data collection, and community pharmacy locations in the study region at the time. There were 52 community pharmacies in the 8-county region.

Law enforcement interactions

The mean number of times participants reported that LE stopped and searched them, their car, or their belongings in the past 6 months was 5.17 (SD = 15.3; median = 2.0; range = 0–180). When removing outliers (4 individuals who reported being stopped and searched more than 50 times in the past 6 months), the mean was 3.74 (SD = 6.8; median = 2.0; range = 0–50). The mean number of times participants reported being arrested and booked for offenses other than minor traffic violations in the past 6 months was 2.42 (SD = 7.3; median = 1.0; range = 0–95). When removing 1 outlier (an individual who reported being arrested and booked 95 times in the past 6 months), the mean was 1.94 (SD = 3.0; median = 1.0; range = 0–25).

Sources and price of syringes

Table 1 presents the sources where participants reported getting syringes at any time during the past 30 days, with pharmacies and SSPs being endorsed most often. The places where participants reported getting the *most* syringes during the past 30 days also were pharmacies (37.5%), SSPs (27.8%), friends/acquaintances (11.7%), and secondary exchangers (10.4%). In terms of frequency, participants obtained syringes from SSPs 7.6 times on average (SD = 8.3; range = 0–30) and from pharmacies 4.9 times on average (SD = 6.4; range = 0–30) over the past 30 days. The mean reported “street price” of syringes was \$3.40 and ranged from \$0 (n = 11) to \$22 (n = 1).

Ease of syringe access

Participants’ mean level of agreement that it was easy for them to get new, clean syringes was 2.85 (SD = 1.4; median = 3). Sixty-nine percent (n = 213) somewhat or strongly agreed that it was easy to get clean syringes. Over half of participants (n = 178, 57.6%) reported that a mobile SSP came close to where they lived or that they could walk or drive to an SSP in less than 30 minutes. Forty-three (13.9%) participants reported that they had to drive 30–60 minutes to an SSP, and 87 (28.2%) reported that they had to drive more than an hour to an SSP or that there was no SSP close to them. Only distance to SSP was significant in the regression model ($P < .001$) predicting perceived ease of access, with a longer distance to the SSP being negatively associated with perceived syringe access when controlling for other variables (Table 2).

Sources of syringes and perceived ease of access

Participants perceived greater ease of access to sterile syringes when they reported getting syringes from an SSP (Table 3). In contrast, participants perceived lower ease of access when they reported getting syringes from a dealer/seller, friend/acquaintance, or found syringes in the past 30 days. The further participants had to travel to reach an SSP or receive syringes from an SSP, the less likely they were to report perceiving easy access to syringes (Pearson correlation = -0.35 , $P < .001$).

Sources of syringes and law enforcement interactions

Participants reported being stopped and searched significantly more often over the past 6 months if they obtained syringes from an SSP, secondary exchanger, or a person who sells drugs or syringes. Specifically, participants who obtained syringes from an SSP reported being stopped and searched 5.39 times, on average, compared to 2.90 times if they did not obtain syringes from an SSP ($P = .004$). Similarly, participants who obtained syringes from a person who sells drugs or syringes reported being stopped and searched 6.23 times compared to 3.33 times if they did not obtain syringes from that source ($P < .01$). Participants who obtained syringes from a secondary exchanger reported being stopped and searched 5.08 times compared to 3.29 times if they did not obtain syringes from that source ($P < .05$). Interactions with LE were not significantly correlated with participants’ perceptions of ease of access to syringes.

Injection and injecting supply sharing behaviors

There was a fairly even distribution in how many times per day participants injected drugs over the past 30 days; 24.6% (n = 76) injected more than 3 times per day, 23% (n = 71) injected 2–3 times per day, 25.2% (n = 78) injected daily, and 27.2% (n = 84) injected less than daily. As a whole, participants reported sharing used injection supplies (mean = 10.75; SD = 21.34) more than twice as often as sharing used syringes (mean = 4.51; SD = 11.2).

Sharing behaviors and demographic variables

A slight majority of participants (54.7%) reported that they had not engaged in receptive syringe sharing in the past 30 days. On average, women reported engaging in all sharing behaviors more than men, but only 1 behavior reached statistical significance with women (mean = 12.59) being significantly more likely than men (mean = 7.67) to inject drugs that somebody else prepared, mixed, or divided with a used syringe ($P = .02$). Additionally, participants who were younger (Pearson correlation = -0.21 , $P < .001$) reported injecting drugs that somebody else prepared, mixed, or divided with a used syringe more often.

Sharing behaviors and ease of access

The more participants agreed that it was easy to get sterile syringes, the less likely they were to report using a syringe someone else had used (Pearson correlation = -0.18 , $P < .01$). Ease of syringe access was not significantly associated with any other sharing behaviors. Neither the price of syringes nor the distance traveled to reach an SSP were significantly associated with sharing behaviors.

Sharing behaviors and law enforcement interactions

Only 1 sharing behavior was significantly associated with LE interactions. In this sample, being stopped and searched was positively correlated with injecting drugs that somebody else prepared, mixed, or divided with a used syringe (Pearson correlation = 0.17 , $P < .01$).

DISCUSSION

This study sought to examine the relationships between syringe sources, perceived ease of access to sterile syringes, and various structural and contextual factors for rural Appalachian PWID. Like 1 other study conducted in a rural Appalachian county,⁷² our results confirm the importance of SSPs: people who were able to obtain syringes from SSPs reported that it was easier to access sterile syringes, and individuals who reported easier access to sterile syringes were less likely to report sharing used syringes. The study findings also raise concerns about consistent access to sterile syringes, since individuals reported lower perceived ease of syringe access if they obtained syringes from persons who sell drugs or syringes, partners, friends, or found syringes.

Our findings highlight complexities in syringe access in this rural Appalachian area. We found that, overall, people obtained the *most* syringes from pharmacies in the past 30 days, but obtained syringes more frequently from SSPs. A possible reason for this is the greater number and geographic distribution of pharmacies in the region (n = 52) compared with just 3 SSPs. However, the presence of pharmacies does not necessarily equate with greater

syringe access. Although pharmacies have been identified as important sources of syringes for PWID,⁷³ research has also documented that pharmacies often do not sell syringes to individuals who do not have a prescription for an injectable medication, and that PWID report stigmatizing interactions at pharmacies.^{51,74–77} For example, a study conducted in West Virginia with a similar population identified difficulty with purchasing syringes from a pharmacy as one of the greatest barriers to syringe access.⁵¹ Given the stigmatized nature of these topics and the limitations of quantitative research for exploring complex and stigmatized topics, future research to examine individuals' experiences purchasing syringes at pharmacies and perceived ease of access to sterile supplies is warranted and may benefit from a qualitative approach.^{78–82}

The current study found that friends and acquaintances were the third most common source of syringes. This finding is similar to a study of urban PWID in San Francisco, which found that friends were the second most common source of syringes.⁷³ In our rural sample, individuals who obtained sterile syringes from their friends also reported lower ease of access. Possible reasons for this finding include that PWID may obtain sterile syringes from a friend when they are unable to access an SSP or pharmacy first. People who obtained syringes from secondary exchangers were more likely to report being stopped and searched by LE. Given that earlier research found secondary exchange was an important source of new syringes for rural PWID,¹³ the apparent association between accessing syringes through secondary exchange and encountering LE harassment is a cause for concern.

Many participants in the study sample had access to SSPs, even though only 3 SSPs were operating at the time of data collection and served a 3,482 square mile area. The importance of access to SSPs in rural areas was supported by the association between traveling farther to receive syringes from an SSP and lower perceived ease of access to sterile syringes. These findings highlight the positive impact that SSPs can have on syringe access in rural areas. Unfortunately, many rural communities do not have similar levels of access to SSPs, particularly in southern and central Appalachia.^{17,33,44}

The current study found levels of receptive syringe sharing (43.5%) that were nearly identical to another recent study conducted with a rural Appalachian population in West Virginia.⁷² In that study, 43% of participants reported receptive syringe sharing in the past 6 months; this sharing behavior was higher among participants who reported not having accessed an SSP. Women in our sample were more likely to inject substances that someone else had prepared, mixed, or divided with a used syringe. This finding is consistent with the body of literature that many cis-women begin injecting with an intimate partner or someone else preparing the shot for them or directly injecting them.⁸³ Existing research suggests that women are more likely than men to report their first and early experiences of IDU involve being injected by an intimate partner.^{83,84} Harm reduction research suggests that women who learn to prepare their own drugs and inject themselves may be better protected from infectious disease transmission.⁸⁴

Results from this study highlighted that participants in our sample were more likely to share injection supplies than to share syringes. Similarly, another study found that PWID reported sharing cookers, cotton, or water more often than sharing syringes.⁷³ Possible

explanations for this finding include that there may be greater access to sterile syringes than to other injection supplies in the region, and/or PWID in the region might lack awareness of the dangers of sharing injection supplies other than syringes. For decades, public health messaging based on harm reduction research has emphasized not sharing syringes but has not placed as much emphasis on the importance of not sharing other injection supplies. Though the World Health Organization has reported since 2004 that injection supplies other than syringes can also transmit HIV, and similar findings are well-documented for HCV,^{23,25,26,85,86} many PWID seem less aware of this. Alternatively, PWID share cookers and cottons because these items contain residual drug solution. PWID may share liquefied drug solutions because it is extremely difficult to divide small amounts of powder accurately, while it is relatively easy to divide small amounts of liquid accurately with a syringe.^{87–89}

Although we found that SSPs improved access to sterile syringes for rural PWID, LE interactions, such as stop and search behaviors, may undermine SSPs' positive public health impacts, which is similar to what has been reported among PWID in urban areas.^{45–50} The current study's results also suggest that LE stop and search behaviors were associated with injecting substances someone else had prepared with used supplies, which could further increase HIV and HCV risks. These findings are in line with a growing body of literature on how LE presence near SSPs contributes to riskier injecting behavior and how fear of arrest may deter PWID from obtaining new syringes^{45–50,55} or using a new needle for every injection.⁵¹

Study results revealed that the distance PWID needed to travel to obtain sterile syringes was significantly related to perceptions of ease of access to sterile syringes. Similarly, a study conducted in a rural Appalachian county in West Virginia found that having access to sterile syringes protected against receptive syringe sharing.⁷² This relationship between syringe access and receptive sharing has also been found in urban populations.⁹⁰ Reducing distances to SSPs would likely improve perceived access to sterile syringes for PWID in rural Appalachian NC and similar settings, which has the potential to reduce the spread of infectious diseases and prevent dual HIV-HCV outbreaks. To maximize syringe access, efforts to support infrastructure for rural SSPs, including support for mobile distribution, may need to be coupled with interventions to reduce barriers to obtaining syringes from pharmacies.

Limitations

This study has some limitations that should be taken into consideration in interpreting the results. First, all data are cross-sectional, so we cannot determine whether the significant associations we described are causal in nature. Cohort studies with rural Appalachian PWID could help elucidate the relationship between LE interactions and syringe sharing behaviors. We also cannot generalize study results beyond the 8-county region of study, and in particular, the 2 counties in which most study participants had slept most in the past 30 days. Though recruitment resulted in a diverse sample, there could have been selection bias, whereby individuals who participated could have been systematically different from the general PWID population. For example, participants in our sample may have had greater access to SSPs than the general population of rural PWID. Also, survey questions had been

used previously with populations of PWID and were administered via ACASI to reduce social desirability bias; however, some questions may not have been fully understood by participants.

CONCLUSIONS

Our findings have implications for both the distribution of sterile syringes and public health messaging priorities for organizations that educate PWID about syringe use. SSPs, particularly those with mobile services, may reduce barriers to sterile syringe access among rural PWID. Thus, federal and state efforts to reduce HIV/HCV transmission in rural areas should increase access to SSPs and consider funding mobile units. Due to pharmacies being common sources of syringes, it is important to address stigma through training of pharmacists and promotion of store policies that allow for sale of syringes without restrictions. In addition, because individuals in our sample were much more likely to share injection supplies other than syringes, at a local level, SSPs and other harm reduction organizations should educate PWID about the importance of not sharing injection supplies. More broadly, it may be worthwhile to promote larger scale targeted public health messaging about the importance of not sharing injection supplies, since many rural residents do not have access to SSPs or other harm reduction organizations. In terms of future research, examining the relationship between LE stop and search behaviors, syringe sources, and syringe sharing behaviors also warrants greater investigation. In the meantime, LE entities should be educated not to interfere with the public health benefits of SSPs for preventing infectious disease transmission by reducing syringe and syringe supply sharing behaviors.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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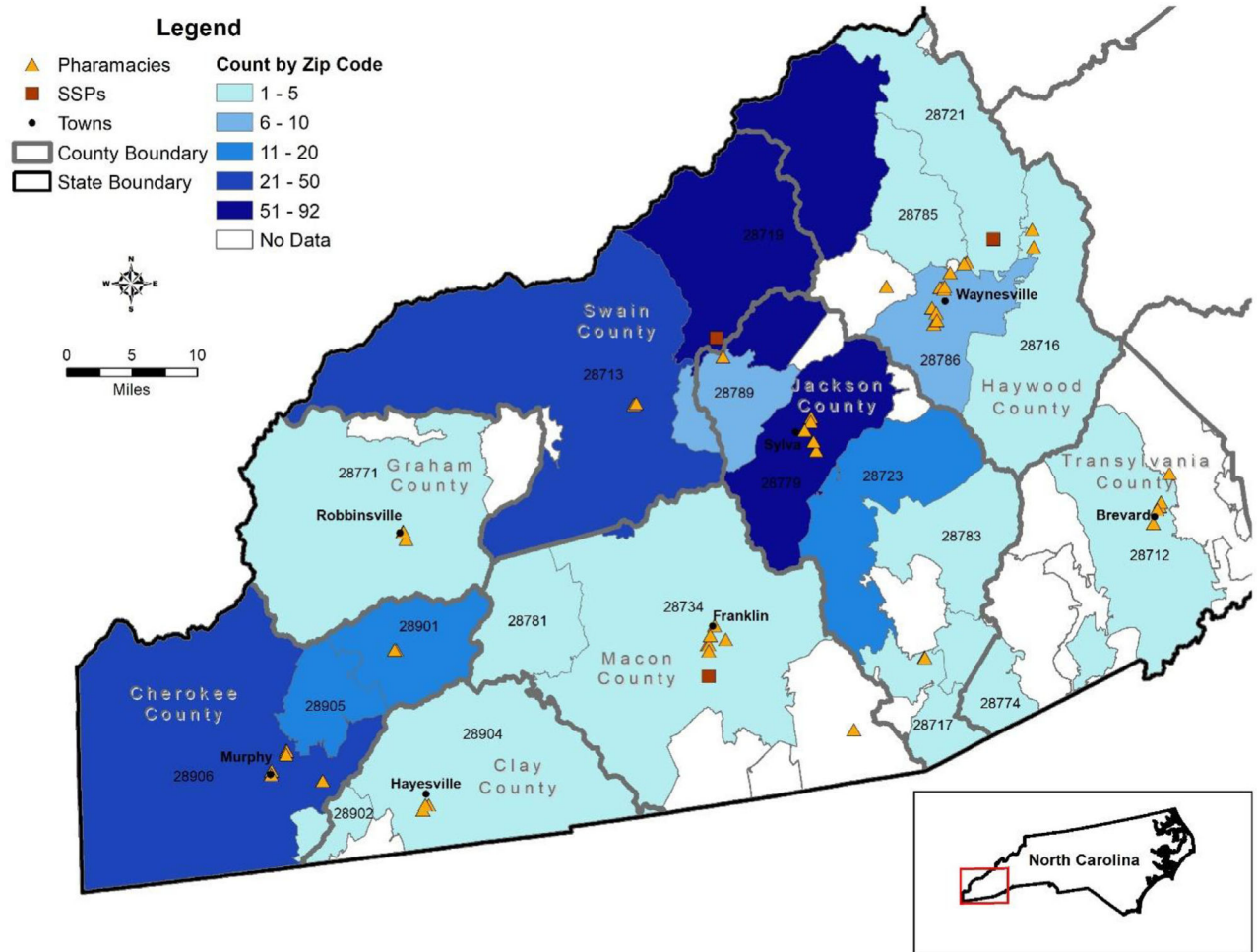


FIGURE 1. Locations of community pharmacies, syringe service programs, and zip codes where participants slept most over the past 30 days

TABLE 1

Sample characteristics (N = 309)

Characteristic	Frequency	Percent
<i>Age in years (mean, SD; range: 18–70)</i>	34.55	10.6
<i>Gender</i>		
Female	148	47.9
Male	161	52.1
<i>Race</i>		
African American or Black	5	1.6
White	211	68.3
American Indian	79	25.6
Mixed race	11	3.6
Other	2	0.6
Not reported	1	0.3
<i>Ethnicity</i>		
Hispanic or Latino	17	5.5
<i>Highest level of education</i>		
Less than high school	61	19.7
High school graduate or GED	140	45.3
Some college	76	24.6
Associates degree, trade, or technical school	26	8.4
Bachelors degree or more	6	1.9
Lived in a county identified by the CDC as at risk for dual HIV/HCV outbreak ⁴²	89	28.8
Participants' sources of syringes in the past 30 days (n = 298)	159	51.5
Pharmacy	115	37.2
Syringe exchange	95	30.7
Friend or acquaintance	88	28.5
Secondary exchanger	52	16.8
Person who sells drugs or syringe seller	47	15.2
Partner or relative	10	3.2
Found needles	4	1.3
Farm or vet supply		

TABLE 2

Linear regression results for perceived ease of syringe access

Variable	Beta (P-value)
Gender	0.06 (.52)
Years of school finished	-0.08 (.47)
Race	1.43 (.16)
Ethnicity	-0.48 (.64)
Age (in years)	0.13 (.22)
Number of injections per day	-0.17 (.11)
How often individual had been stopped and searched by law enforcement in the past 6 months ^a	-0.19 (.85)
How often individual had been arrested in the past 6 months ^a	-0.01 (.95)
Distance to SSP ^b	-0.38 (<.001)
Current street value of syringe in community (in dollars)	0.02 (.83)
Adjusted R ²	0.16

^aOutliers had been removed for the variables included in the model; 4 outliers for the stopped and searched variable and 1 outlier for the arrest variable.

^bDistance to SSP measured as 1 = could walk or drive there in less than 30 minutes or a mobile program comes close to where they lived, 2 = could drive there in 30–60 minutes, or 3 = more than an hour drive or no syringe access program in their community.

TABLE 3

Mean perceived ease of syringe access and sources of sterile syringes (N = 296)

	Obtained syringes from this source	Did not obtain syringes from this source	T-test (P-value)
SSP	3.56	2.42	-7.51 (P<.001)
Drug dealer/syringe seller	2.19	3.00	3.87 (P<.001)
Friend/acquaintance	2.35	3.09	4.45 (P<.001)
Found syringes	1.70	2.90	2.70 (P<.01)

Note: Perceived ease of access to sterile syringes responses ranged from 1 = strongly disagree to 5 = strongly agree.